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ABSTRACT

In an effort to help describe and explain why people do not read and subscribe to newspapers, a study built on previous research by adding two new contributions: (1) reliance on a four-wave panel data-set rather than on a one-shot survey; and (2) use of a dynamic modeling procedure rather than cross-sectional analysis. The problem with previous studies of newspaper subscribing that use static comparison, is that the technique may be sufficient for descriptive purposes but can do little beyond that. Use of a longitudinal study that links "actual" changes in lifestyles to changes in subscribing status with a four-wave panel data-set solved this problem. A data-set from the American Society of Newspaper Editors' Readership and Research Committee (ASNE) and a dynamic modeling tool developed by Paul Allison were used to supply data. Results indicated that there were two underlying processes going on in the subscribing decision, and that static and dynamic variables played different roles in influencing these processes. Results also showed that the conventional cross-sectional comparison is not sufficient to capture and explain this complexity, whereas dynamic analysis on longitudinal data may improve knowledge of the process. (Twenty-five notes are included, and 10 references are appended.) (MS)

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DROPPING VS. RESTARTING: A DYNAMIC ANALYSIS OF TWO NEWSPAPER SUBSCRIBING BEHAVIORS

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The post-war years have witnessed a continuous decline in newspaper subscription in this country. For example, the ratio of newspaper circulation to households dropped almost 50% from 1945 to 1985. (Fielder and Barnum, April, 1987, p.7) This trend has attracted serious concerns of newspaper industry and social elites as well. The former is concerned about the loss of profits, whereas the latter worries about the decay of public literacy and morals. Accordingly, mass communication scholars have made great efforts in describing and explaining why people don't read and subscribe to newspapers.

This paper builds on this previous research, with two new contributions as compared with the earlier studies. First, it relies on a four-wave panel data-set rather than one-shot survey. Second, it uses a dynamic modeling procedure rather than cross-sectional analysis. As the results show, the subscribing behaviors are more complex than what static perspectives suggested. There is more than one process going on in subscribing -- such as someone dropping while others returning. The dynamic model, incorporated with longitudinal data, may improve our understanding of the complexity of these processes.

PROBLEMS WITH STATIC COMPARISON

Static comparison is the fundamental approach used by the previous studies of newspaper subscribing (McCombs, 1977). Typically, a one-wave survey is conducted and then the data are analyzed cross-sectionally. The main research interests are in the differences between socio-economic groups with regard to their readership or subscribing status. Such a

comparison may be sufficient for descriptive purposes, but any attempt to go beyond that will invite some problems.

First of all, static comparison requires an equilibrium assumption for the process under study, which means the process is constant over time rather than changeable. Unfortunately, this assumption is seldom met in the process of newspaper subscribing. For example, equilibrium implies that while there is much back and forth going on in subscribing, the ratio of subscribers to non-subscribers in a particular population is always the same over time. Apparently, this is not the case in the U.S., as indicated in the first paragraph of this paper.

Second, static comparison assumes that there is a single process caused by certain factors -- e.g., people drop subscriptions because of social-economic disadvantages. As a matter of fact, there is usually more than one process underlying newspaper subscribing -- e.g., some people drop out while others add in. They may be two or more different processes, caused by different factors. The cross-sectional comparison may discard these differences by simply searching for one process and its determinants.

Third, static comparison assumes that the causal factors are constant over time. It is true that some of the independent variables used in the previous studies, such as sex and race, never change over time. On the other hand, there are some other variables that vary from time to time. For instance, readers' experience with the content of newspaper, which presumably influences the subscribing decision, may change over time. However, the static cross-sectional analysis can't tap such a dynamic relationship.

Chaffee and Choe (1981) point out several problems with a static comparison perspective in readership studies that also hold in subscription studies:

> "Such static explanations stress a conception of newspaper reading and non-reading as stable, habitual behaviors grounded in the social structure...But for many people, newspaper reading is not a persistent, stable behavior throughout one's lifetime...Periodic fluctuation between reading and non-reading cannot be explained by stable individual differences growing out of socio-economic disadvantage...The decisive behavior at stake is the dynamic process of acquiring or discontinuing the habit of daily newspaper reading, not the static condition of maintaining a habit of reading or non-reading."

TWO STUDIES WITH LONGITUDINAL PERSPECTIVES

To overcome these weaknesses in the static, cross-sectional approach, some communication scholars have proposed adopting dynamic perspectives and longitudinal designs. Among the previous studies, two pieces by Chaffee-Choe (1981) and Stamm-Weis (1982) are of particular significance, because they try to establish some conceptual frameworks for empirical dynamic studies of subscribing behavior.

Chaffee and Choe suggest that there are three sets of constraints affecting newspaper reading behaviors. First and most pervasive are structural constraints determined by the person's disadvantageous location in the social structure, such as income and educational background. While this type of constraints may work in the lower social strata, it is hard to explain why there are non-readers in the middle and upper classes. Their non-reading behavior, usually a temporary action, may coincide with a current transition of life-cycle, such as changes in residence, marital status, or employment, which can be called transitional constraints. The

third concept, self-constraints, is defined as low interest in political activities and community affairs and is added to predict why some people drop reading while some others pick up reading. Through secondary analysis of a national election survey data-set, Chaffee and Choe find these hypotheses are partly supported. Structural constraints do play the most pervasive part in differentiating non-readers from readers. Transitional constraints further distinguish unstable readers (dropping or adding reading) from stable readers. However, the role of self-constraints is not clear.

Taking a narrower approach focusing on the point of transition, Stamm and Weis note that changes in subscribing status are related to major transitions in the lifetime of the individual. The underlying assumption stems from discontinuity theory, which asserts that people's distinctive communication needs may arise at the time when major reorganization of their lives is undertaken, such as moving, changing jobs, getting married, and settling into a community.

Specifically, Stamm and Weis suggest that persons who are in the process of settling down in a community (the so-called "settlers") are more likely to be new subscribers than those who have not begun the transition (the "drifters"), have already completed it (the "natives"), or are about to leave (the "relocators"). This is exactly opposite to what the cross-sectional studies (e.g., Westley and Severin, 1964) report--that the newcomers to a community are less likely than native residents to be newspaper subscribers. Stamm and Weis test their hypothesis in a survey of Seattle residents and find that 40% of the settlers are new or recent newspaper subscribers, whereas 30% of the drifters, 14% of the natives,

and 20% of the relocators are new or recent subscribers.

In sum, both studies reveal that people's life transitions are very important in the newspaper consumption decision. Thus, they set an agenda for the further research that goes beyond the conventional socio-economic variables and incorporates transitional explanations into our current understanding. However, further development of dynamic explanations of the newspaper reading/subscribing process is largely limited by their empirical data-sets.

For example, while Stamm and Weis strongly distrust the static approach, their study is still a one-shot design due to budget limitation. Thus they have to rely on respondents' memories to trace their settling and subscribing history that is so crucial for dynamic analysis. Chaffee and Choe luckily obtained a two-wave panel data-set from a national election study conducted in 1974 and 1976 respectively. Nevertheless, like any other secondary analysis, their conceptualization of transitional constraints cannot be fully tested by the data available.[1] Being aware of these limitations, the authors of the two papers call for longitudinal studies that link actual changes in lifestyles to changes in subscribing status (Stamm and Weis, 1982), and suggest these longitudinal studies may be over longer periods with more than two waves of measurement (Chaffee and Choe, 1981).

THE ASNE ONE-YEAR PANEL STUDY

Fortunately, a fairly comprehensive and sophisticated longitudinal data-set was recently released by the American Society of Newspaper Editors' Readership and Research Committee. Because this paper is a

secondary analysis of the data-set, a brief introduction is given in this section. For a detailed description of the data, see Fielder and Barnum (April, 1987).

This is a four-wave panel study of new newspaper subscribers during a one-year span. Nine dailies--3 large-size, 3 medium, and 3 small[2]--participated in the study. Each paper located and interviewed 200 new subscribers in its circulation area. The field survey started with 1,745 recent subscribers in February 1986. Three follow-up interviews were conducted in the succeeding June-July 1986; November-December 1986; and February 1987. Thus, the one-year span is divided into three periods with four months for each.

In addition to demographics, the data provide two sets of information very useful for dynamic analysis. The first one includes the measures of life-cycle transition, such as the length of residence in the area, and major changes in family (family size, residence location, health condition, marital status, employment, and financial situation) within the one-year period. Another set of questions, concerning experience with subscription, is recorded over the four waves, which is also uncommon in mass communication research. Among these variables are the reasons for subscribing to the particular newspaper, the subscription to competing papers (if any), and reading and evaluating the paper.

A number of first-hand findings from the study are reported by the two key investigators, Fielder and Barnum (April, 1987). After one year, they find only half of the new starts (53%) are retained while the rest either drop out (43%) or are unknown (4%). Among the major contributors to retention or exit are people's pre-subscribing history, particularly

type of start (volunteer or pressure), feelings about the importance of news, and some demographic characteristics. The people who had a previous subscription history but canceled it for one reason or another, for example, tend to be more likely to stay later on. The people who started a subscription under certain pressures, such as a special discount offer or carrier persuasion, are more likely to quit than those who volunteered to start a subscription. Young age (under 35), single, minority, less-educated, and some other demographics are also associated with the dropping group.

While these findings largely coincide with the existing knowledge of subscribing behavior, some unusual patterns emerge from the study. The most striking is that people's evaluation of the daily's content/quality bears little relationship to their subscription decision. "They love us; but anyhow, they leave us." Fielder and Barnum highlight this point in the title of their report.

A closer look at the ASNE report raises some questions about its analytical strategy, based on the knowledge of the disadvantages of static comparison and the advantages of dynamic analysis discussed above. Although the data-set in hand is a longitudinal design, the basic analysis still follows the cross-sectional comparison, especially between stayers and droppers. One of the possible problems with such an approach is that it may obscure a substantial distinction between <u>voluntary droppers</u> and <u>involuntary droppers</u> by putting them together into the dropper group. Here the former refers to those who are involuntary starts, become non-subscribers even when no life-cycle transition happened to them, and may no longer come back; whereas the latter are the ones who are voluntary

starts, then have to stop the subscription because of certain changes in personal life, but may return once the transition is over. If these two opposite trends do exist in real life, then a different analytical strategy is desired, which is the main task carried out in the following sections of this paper.

THE ALLISON MODEL

As stated before, this study is a secondary analysis of the ASNE subscription data. The basic strategy for analysis is a combination of two considerations: (a) differentiating the change of subscribing status into two processes--dropping out and coming back; and (b) giving more attention to the dynamic variables than to the static variables.

Operationally, the first consideration implies that two separate equations are needed, one for dropping and another for returning. When the two equations are built, a question naturally arises: Are the two processes determined by the same factors, in the same direction, and with the same strength? If not, then there is reason to believe that two different processes independently operate in the real world, and we should not mix them together.

Under the second consideration, a comparison will be made between two sets of variables -- dynamic variables vs. static variables. The dynamic variables here refer both to lifestyle transitions and experience with the subscription, because they may vary over the course of time. On the other hand, the static variables mainly refer to the socio-economic indicators that change never or little as time goes by. We expect to find more information about the effects of the dynamic variables on subscribing

behaviors, since we already know much about the static variables.

To answer these questions, this study uses a newly-developed dynamic modeling tool -- namely the discrete-time, non-repeated event, logit-linear model. Because this method is mainly attributed to Paul Allison (1982, 1984), it will be called the Allison model afterward. As Allison points out, this method is especially appropriate for a process with the following characteristics: (a) It changes from one category to another rather than from one quantity to another; (b) The time points when the change occurs are measured in discrete or large units (e.g., monthly or annually) rather than continuous or relatively small units (daily or weekly); and (c) The change only occurs once for a particular individual (e.g., from life to death) rather than is repeated. Also, as demonstrated by Allison (1984, p.14-21), the model is the most convenient procedure among the family of dynamic models, because it is easy to understand and implement. (For a comprehensive survey of various dynamic modeling methods, see Tuma and Hannan, 1984.)

The ASNE data seem to fit well the Allison model. First, change in subscribing status (e.g., from subscriber to non-subscriber, or from dropper to restarter) is a category transition. Second, the measure of time length in the ASNE data is neither consistent nor completed.[3] The only consistent and completed information about the time points is the four-month interval between interviews. Because the unit of the four-month period is quite large, it is more appropriate to use a discrete-time model in this case (Allison, 1984, p.14), though continuous-time models are generally more sophisticated. Finally, although the subscribing process is really a repeated event (an individual may be in and out of

subscribing for many times in the whole life span), there are only a small number of repeated events in the particular one-year period (only 15 persons re-dropped and no re-restarts happened).[4]

A simplified expression of the discrete-time event model is as follows:[5]

$$L(t) = B_0(t) + B_1X_1 + B_2X_2(t)$$

Although the denotation of the model looks rather complicated, it is quite analogous to multiple regression equation with a few exceptions. Like the regression model, the left side of the equation--L(t)--is the dependent variable while the right terms are the independent variables. It is easy to see that the dependent variable is a linear function of the independent variables. However, this model is substantially different from the regression model in the following aspects:

(a) Unlike regression in which the dependent variable is an directly-observed variable, L(t) is an unobserved variable that we cannot directly measure from survey data. Instead, L(t) is a <u>probability</u> that an event will occur at a particular time to a particular individual, given that the individual is eligible for the event at that time.[6] In our case, L(t) is the likelihood (also called "hazard rate") that a subscriber will drop out at a four-month period; or L(t) is the likelihood that a dropper will restart a subscription in a four-month period, depending on whether dropping or returning process is being analyzed.

(b) As in regression, X_1 and $X_2(t)$ in the above model may be two vectors, each of which consists of a number of independent variables; $B_0(t)$ is the intercept, and B_1 and B_2 are two sets of the estimated parameters. Also as in regression, X_1 is a set of time-constant

variables, such as sex and race that never change over time. Since our data were collected in a one-year span, most of the demographic variables fall into such a category. However, a major difference between the Allison model and OLS regression exists in $X_2(t)$, a set of time-varying variables. That is a very important feature of the model. In our case, these time-varying variables mainly include people's experience with the newspaper subscription.

In sum, defined by the Allison model, the hazard rate that a subscriber leaves (or returns to) subscribing is a linear function of a set of time-constant explanatory variables and a set of time-varying variables. The key concepts of hazard rate and time-varying explanatory variables in the model are at the heart of testing the hypotheses in this study. It is also obvious that information about these aspects will greatly enhance our knowledge of complexity of subscribing behaviors, but won't be available in the static comparison model.

DATA ORGANIZATION AND MEASURES

The original ASNE data-set is a most common one, in which the individual is the unit of analysis and each individual comprises one case. However, the Allison model requires the data-set be organized in such a way that the unit of analysis is an observation at one time unit (i.e., person-period) and individuals may have multiple observations depending on how long they survive in the process.[7]

Since there are two equations--dropping and restarting--to be estimated, two separate data-sets are generated from the original ASNE data. The first one, used for the dropping equation, consists of 1,902

cases; and the second, for restarting, contains 456 cases. Notice both the case numbers are quite different from the original one (1,745).(See Figure 1)

Figure 1 about here

In the first data-set, the number of observations for each individual varies from 1 to 3, because there are up to 3 periods in the one-year span. The person will have one observation if he/she drops out in the first period (totally 286 individuals and the same number of observations). There are two cases for each of those who survive to the second period but drop out at this stage (totally 112 individuals or 112X2=224 observations). In the third period, there are 464 individuals or (464X3=) 1,392 observed cases.[8]

The second data-set has a relatively small size because the eligible sample for restarting in this case is much smaller than that for dropping. The process of returning to subscription begins at the second period, and the individuals who are eligible for returning at that time only include the 248 dropping at the first period. Among them, 40 resume their subscription at the second period, and other 24 do so at the third period. No further transitions from dropping to restarting are observed, because of the end of the interview at that time.

Most of the independent variables in this analysis (see Table 1) are no more than the standard measures used elsewhere. Actually, these are made as comparable to the previous studies as possible.[9] Occasionally, no totally equivalent measures are available. In this case, some substitutions are made.[10]For the convenience of computation, all the

independent variables are recoded into dichotomy, except for city size that is a trichotomy.[11]

Table 1 about here

A number of "new" variables (in the sense that they were not available in the previous studies) are added into this analysis.[12] Among them, the most important ones are five time-varying variables: the duration of subscription, readership, evaluation of newspaper performance, plan to further subscription, and subscription to competing newspapers. They were measured throughout the four-wave survey. Thus, their values may vary over different observations. The data organization discussed before enables them to be incorporated into statistical analysis, because each individual has the same values of the time-constant variables but <u>different</u> values of the time-varying variables in each of his/her observations. (Allison, 1984, p.19) Hence, we may investigate how people's experience with subscription affect their decision, which is impossible in cross-sectional designs.[13]

The above discussion implies a lagged, rather than instantaneous, causality between the independent variables and the dropping/restarting decisions. The length of causal lag in this analysis is four months, which is longer enough than the time required to measure an observational unit on all variables. (Heise, 1970, pp.5) However, the four-month time lag is artificially defined. In fact, it is pre-determined by the ASNE data. Also, previous studies have revealed little evidence of the length of time lag. Thus, this study does not ensure the assumptions that the four-month lag approximates the actual causal lag, and that all

independent variables have the same causal intervals.

Maximum likelihood estimation (ML), rather than ordinary least squares estimation (OLS), is used for the two equations. (For the reasons why OLS is inappropriate for a dichotomous dependent variable, see Hanushek and Jackson, pp.180-187) One of the major advantages ML has is that it allows estimation of the parameters with censored events (which is a major concern in this analysis). The censored events here refer to the fact that after February 1987, the dropping and restarting processes are interrupted by the end of the survey. Otherwise, the people remaining in the process may continue to drop (or restart) subscribing. Leaving these censored events out of analysis has been shown to result in serious bias (Tuma and Hannan, 1978). To handle the censoring issue, ML leads to estimates that are asymptomatically unbiased.(For more about ML, see Tuma and Hannan.) Maximum likelihood estimation for this study is accomplished with SPSS-X's PROBIT procedure (by using its optional LOGIT model).

RESULTS AND DISCUSSIONS

Table 2 gives the estimates of the determinants for both dropping and restarting processes. Since the value of the independent variables is logged transformation and the value of the dependent variables is odds ratio, the interpretation of these estimates is much less straightforward than that for OLS estimates. For simplicity, the following sections only discuss their relative importance.

Table 2 about here

The determinants for dropping process There are 14 significant

ones, including sex, age, race, marital status, residence location, information seeking, type of starting subscription, receipt of discount offer, former subscription, duration at subscription, readership, and plan of future subscribing. Specifically, a household is more likely to stop subscription, for example, if its main decision-maker is male. The same thing is true if the decision maker is under 35, non-Whites, single. On the other hand, a household is less subject to dropping if it recently moves in a new address, or its members mainly look for information rather than ads from the newspaper. The household that volunteer to start subscription is more likely to stay than the one that is forced; whereas the receiver of special offer is less stable than the non-receiver. The pre-subscription history also helps prevent a household from dropping. The more often people read the newspaper, the less likely they stop subscribing to it. Finally, planning to continue subscription has strong impact on staying with subscription, which means that the plan for the future is the best predictor of the behavior in the future. (For the interpretation of the "duration" variables, see the discussion later.)

Among the above significant determinants, three (age, marital status, and change in residence) especially confirm the transitional hypothesis suggested by Chaffee-Choe and Stamm-Weis: The older a household head, the less mobile the household is, and thus the more stable it stay with subscription.[14] The same pattern holds for the married couple. The negative relationship between the length in the in the current address and the dropping decision reveals that the more recently a household is settled down, the less likely it stop subscription. (See Stamm-Weis)

On the other hand, education, income, employment status, city size, house ownership, the length of time in a community, cosmopolitism /localism, rating of newspaper performance, and subscribing to other dailies have little impact on dropping decision. But some of them were found to be significant in the earlier studies. For example, Chaffee-Choe report that the structural constraints (constructed by education and income) are most pervasive.[15] Also, our data show that house ownership, the length of time residing in a community, and cosmopolitism/localism are insignificant; whereas in the Stamm-Weis study, these variables contribute to discriminate different subscribing statuses.

Determinants for restarting process There are only 3 significant determinants for restarting process, much fewer than for dropping process. First, the length of time living in a community has a negative impact on restarting subscription. The longer a household has been in the community, the more likely it will undertake certain transition (e.g., move out the community), and in turn the less likely to restart. Second, the smaller a city where a household resides, the more likely a dropped household will restart subscription. That is probably because the smaller the city is, the stronger the residents' identification to the community is. (For the interpretation of duration variables also see the later discussion.)

There are two major explanations for the fewer significant determinants: (a) There were only two waves for observation of restarting while three waves for dropping;[16] and (b) the number of sample in restarting equation is relative smaller than that in dropping equation. There is reason to believe that if the number of cases had been larger,

some of the variables would have been significant (e.g., race, localism, information-seeking, the type of start, pre-subscription, and readership, see their values in Table 2.)[17] Thus, the conclusion about the restarting process is very tentative.

Are dropping process different from restarting one? The above results already implies that they are quite different from one another. Let us make the distinction more explicit here. First of all, the rates of changes in subscribing status differ from dropping to restarting. Among the 1,902 person-period observations that are subject to drop subscribing at one four-month period or another, there are 425 actual dropping events occurred. Thus, the overall hazard rate (the probability that a subscriber may leave)is about 22%. On the other hand, the overall chance for the people who stopped subscribing to restart subscribing is much lower than the dropping rate. There are 456 observed droppers in the period from June of 1986 to February of 1987, but only 14% (64 persons) of them resume subscribing.

The two processes not only differ in the rates of change, but are determined by different factors. Among the independent variables, eleven are significant for dropping but not so for restarting;[18] whereas two are insignificant for dropping but significant for restarting.[19] A good example is that while the length of time living in a community affects restarting (but not dropping), the length of time living in the current address has impact on dropping (but not restarting).

Although the duration at subscription is significant for both processes,[20] a closer look reveals that they are toward different directions. For dropping process, there is an inert law: the longer a

household stays with the subscription, the less likely it is to drop.[21] But there is an accelerative law for restarting: the longer a dropped household stays outside subscription, the more likely it is to restart.[22]

Are dynamic variables more plausible than static variables? The Chaffee-Choe study shows the structural constraints (a static concept constructed by education and income) is more pervasive than the transitional constraints (a dynamic concept constructed by age and change in residence).[23] This study finds, as stated before, that the dynamic variables (e.g., age and change in residence) play a more rigorous role than the static ones (e.g., education and income), in explaining and predicting dropping behaviors. Moreover, the introduction of the time-varying variables (another set of dynamic variables) into this analysis further reinforces the notion that dynamic variables are more plausible than static variables.[24]

In sum, the data presented here support the speculations that there are two underlying processes going on in the subscribing decision, and that static and dynamic variables play different roles in influencing these processes. The conventional cross-sectional comparison is not sufficient to capture and explain this complexity, whereas dynamic analysis on longitudinal data may improve our knowledge of the processes.

A FINAL CAUTION

Finally, two issues should be particularly addressed: the non-representative sample and the high rate of respondents' "mortality". As Fielder and Barnum point out, the sample is not randomly-drawn; instead, it is strictly selective. Only new subscribers to the voluntary

participating newspapers are eligible for interview. Neither stable subscribers nor stable non-subscribers, both of which together may account for the bulk of the population in any American community, are included in the study. Thus, the data should not be viewed as nationally representative.

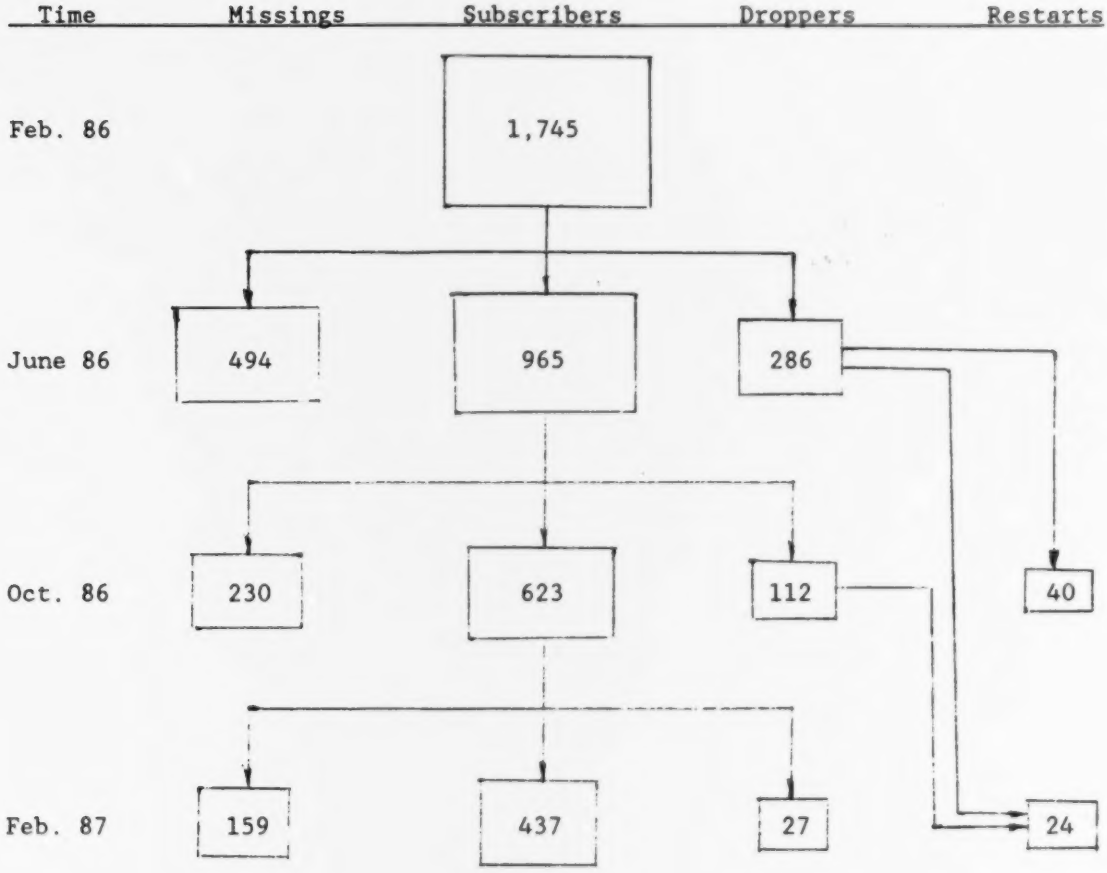
The high mortality refers to a high proportion of the initial respondents being lost from the study for one reason or another over the four waves. Although extraordinary efforts were made to insure that as few respondents as possible were lost from the study,[25] the number of respondents gradually declined from 1,745 to 1,251 (72% of the original size) in the second wave, 985 (56%) in the third wave, and 835 (48%) in the final stage. That raises an issue of random censoring in dynamic analysis.

There are two types of censoring: fixed censoring and random censoring. The fixed censoring occurs in the situation that not every person at risk completes the transition when the observation is ended. For example, 563 initial subscribers stay with the paper by the end of the survey, but each of them are subject to stop subscribing at any time point -- maybe the next morning. As stated above, this kind of censoring can be solved by including these cases and using maximum likelihood estimation. On the other hand, random censoring that mainly refers to the missing cases in the middle way is more troublesome. In the ASNE data, 52% of the original respondents left during the course of interviewing, without leaving any message indicating whether they are still subscribers or already quit. Such a high attrition will inevitably have some impact on the results of this analysis. For example, the dramatic decline in

dropping rate during the three periods might be partly due to a parallel dramatic change--increase in missing rate--for the same time periods. Also, the missing cases might include some restarts, which means if they had been in the study, the sample size for restarting process would have been larger than it is now, and more confirmative conclusions might have been drawn. Whether these impacts are significant remains unknown and waits for further studies.

(End)

Figure 1. Path of the Dropping and Restarting Flaws



Total	883	437[a]	425	64

[a] Those who stay with subscription throughout the one-year period.

Table 1. Definition and Descriptive Statistics of Variables

Definition	Distribution	
	Dropping	Restarting
Dependent Variable		
Dropping (yes-1, no-0)	22%	NA
Restarting (yes-1, no-0)	NA	14%
Time-constant IV's		
Sex (male-1, female-0)	41%	45%
Age (above 35-1, below-0)	60%	48%
Whites (yes-1, no-0)	84%	69%
Education (college-1, below-0)	60%	57%
Income (high-1, low-0)	53%	53%
Married (yes-1, no-0)	67%	63%
Employed (full/part time-1, others-0)	68%	75%
City size (Small-1,	35%	34%
Medium-2,	38%	42%
Large-3)	27%	24%
Housing ownership (self-owned-1, others-0)	57%	49%
Length in community (> 4 yrs-1, below-0)	64%	64%
Length in current address (>1 yr-1, below-0)	50%	56%
Cosmopolitism (yes-1, no-0)[a]	52%	50%
Localism (yes-1, no-0)[a]	66%	63%
Information seeking (yes-1, no-0)[b]	52%	41%
Voluntary start (yes-1, no-0)	47%	29%
Receiving discount (yes-1, no-0)	31%	48%
Pre-subscription (yes-1, no-0)	67%	40%
Time-varying IV's		
Staying at period 1 (yes-1, no-0)	46%	NA
Staying at period 2 (yes-1, no-0)	30%	54%
Staying at period 3 (yes-1, no-0)	24%	46%
Reading frequency (daily-1, others-0)	87%	30%
Newspaper rating (positive-1, others-0)	93%	62%
Further subscribing (continue-1, others-0)	67%	15%
Subscribing to other dailies (yes-1, no-0)	19%	18%

[a] See Note 10.

[b] Measured by the question "Would you say you read the newspaper more for the news and information, more for the ads, or about equally for both?" The answer to "more for the news and information" is recoded as "1" and else as "0".

Table 2. Determinants of Dropping and Restarting Subscription

Independent Variables	Dependent Variables: Dropping	Restarting
Time-constant Variables		
Sex	.08*	.04
Age	-.14***	-.01
Whites	-.13**	-.10
Education	-.05	.04
Income	-.01	.03
Married	-.08*	-.04
Employed	.03	-.05
City size	-.01	-.18***
Housing ownership	-.05	.04
Length in community	-.01	-.25***
Length in current address	.09*	.04
Cosmopolitism	-.01	.03
Localism	-.01	-.12
Information seeking	-.13***	.11
Voluntary start	-.11**	.09
Receiving discount	.14***	-.01
Pre-subscription	-.08*	.10
Time-varying Variables		
Duration (period 1)	+.34***[a]	NA
Duration (period 2)	-.13***	-.56***[a]
Duration (period 3)	-.45***	-.13
Reading frequency	-.14***	-.12
Newspaper rating	.05	.09
Further subscribing	-.22***	-.06
Subscribing to other dailies	-.05	-.03
Number of Cases	1,902	456
Number of Occurred Events	425	64
Average Hazard Rates	.223	.140

[a] They are the intercepts in the estimated equations.
* p <.05;
** p <.01;
*** p <.001.

NOTES

[1] Also, their dependent variable, dichotomized into readers and non-readers, may be too simplified because the reading behavior is really a continuum from very much involved to little involved, and most of the people may fall in the middle despite an upward tendency. A better treatment for such a continuous variable is to use a differential equation model, but it is much more complicated. For a detailed discussion of differential equation model, see Tuma and Hannan(1984).

[2] The large papers are the Chicago Tribune, the (Dallas) Morning News, and The Washington Post; the 3 medium sized ones are The Press-Telegram (Long Beach, California), The Bergen Record (New Jersey), and The Herald-Leader (Lexington, Kentucky); and the 3 small papers are the Herald-Republic (Yakima, Washington), the Reporter-News (Abilene, Texas), and The Lakeland Ledger (Florida).

[3] For example, during the first wave, respondents were asked about the time when they previously subscribed to the paper, if any. They were forced to select one of the three categories: "within the past 12 months," "within the past 5 years," and "over 5 years." Thus, the unit of time measured here is quite rough and inconsistent. The omission of time measure occurs in the case of restarts--when they return to subscribers or how long it takes between the stop and the restart in the year.

[4] A total of 15 persons stopped subscription during the first four-month period and repeated the drop again in the third spell, whereas no repeated restarts are possible in the three spells, because the earliest restarts were identified in the second period, and the survey ended before the repeated restarts might occur (they should have happened in the period of February to June 1987 if the survey had continued).

[5] The complete specification of the Allison model is:

$$\text{Log}\,[P(t)/Q(t)] = B_0(t) + B_1X_1 + B_2X_2(t)$$

where the right side remains unchanged, and the left side is a logit transformation of the original L(t). Here, P(t) is the probability of one outcomes at time t (e.g., dropping subscription), while Q(t) is the probability of another outcome (e.g., retaining subscription). Since the process under study has only two outcomes, Q(t) is equal to 1-P(t). Thus P(t)/Q(t) can be replaced by P(t)/[1-P(t)], an odds-ratio of the two outcomes. For more about this transformation see Hanushek and Jackson (1977, pp.187-89). The difference between the specification in the text and the expression here, however, does not affect our understanding and interpretation of the basic idea described in the paper.

[6] More precisely, as showed by Note 5, L(t) is the logit or the log of the odds ratio. While the probabilities of the odds are bounded from 0 to 1, the logit is unbounded with respect to the values of X's.

[7] In one-shot data, an individual is the same as an observation, because there is only one observation for each individual so that each individual only has one case in the data-file. However, the situation for panel data

is different, and in fact, quite complicated: Each individual may have up to three cases, and moreover, the number of the cases varies from person to person.

[8] No distinction is made between the 437 retaining or the 27 dropping at this stage. Those retaining would have had 4 or more observations if the interviewing had not ended in February 1987. In other words, the observations for the 437 individuals are artificially "censored."

[9] For example, age is dichotomized into "the younger" (under 34) and "the elder" (above 35), suggested by Chaffee-Choe. Five-year is used as the cutting point to dichotomize the length residing in a community, according to Stamm and Weis.

[10] For example, both the Chaffee-Choe and Stamm-Weis studies give a high profile to people's identification/commitment to local community. As a comparison to that localism, Stamm-Weis also use a measure of cosmopolitism. Unfortunately, there are not such measures in the ASNE data. Thus, the scales of cosmopolitism and localism used in this study are composed by some other variables. Cosmopolitism is a combination of three perceptual variables that measures how important national and international news is to the respondents. Similarly, Localism consists of three perceptual variables that measures how important was made local news is to the respondents. It should be pointed out that no attempt to check the equivalence of these substitutes to the original ones, simply due to lack of comparison criteria.

[11] It is because the Allison model specifies a logit procedure to be used, which operates on a multi-crosstabulation. Thus, it is desirable to minimize the number of categories in each variable.

[12] For example, the information of city size is available in the multi-site ASNE project, but not so in the previous studies (most of which are one-site). The type of starting subscription (volunteer or pressured) and the receipt of discount subscription are also among the new variables. The bivariate analysis by Fielder et al. indicates these are important in dropping decision.

[13] Cross-lagged correlation or path analysis over time can also examine the impact of time-varying independent variables. However, they can not incorporate these variables measured at more than two waves into one equation. On the other hand, time series analysis can incorporate time-varying variables into one model, but it requires the variables measured in more than 30 points of time.

[14] Both Chaffee-Choe and Stamm-Weis report age is a very important factor for readership/subscribing status.

[15] But Stamm-Weis report income is not a significant factor.

[16] It is quite possible that the restarting process has not fully evolved when the observation was consored.

[17] In fact, ML estimation requires a large size of data set.

[18] These are sex, age, race, marriage, length in current address, information seeking, voluntary start, discount receipt, pre-subscription, readership, and future subscription. (See Table 2)

[19] They are city size and length in community.

[20] That means both the dropping and restarting processes are time-dependent. In other words, the dropping/restarting behavior is not constant, instead it changes, over time.

[21] Table 2 shows that the coefficient for the duration at the period one is positive (+.34), while that for the period two and three are negative (-.13 and -.45 respectively). That indicates the rate of dropping drastically declines over time, as long as the people stay in the process.

[22] Also see Table 2. The negative impact of duration on restarting is much stronger at period two (-.56) than at period three (-.13), which means the resistance to restarting vanishes over time. The trend also suggests that had the observation continued, the coefficient for duration at the later period might have been positive.

[23] In the Stamm-Weis study, no comparison between the two concepts is made.

[24] This is quite apparent when a comparison is made between the coefficients of the time-varying and the time-constant variables.

[25] Anyone, I assume, who learns the following efforts the ASNE project team made will believe that the achieved completion rate is the practical maximum for such a panel design, and that the high mortality is beyond possible control. These efforts include at least five call-backs, substitute an alternate in the same family to the original respondent who is no longer eligible for interview, trace the respondents whose address or phone number is changed through various sources (friends or relatives, telephone directory assistance, the Post Office). The newspaper circulation records are also used to identify and verify the respondents' status.

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